REMARKS

The Official Action dated December 1, 2003 has been carefully considered. Accordingly, the arguments and remarks presented herein are believed sufficient to overcome the rejections of the Examiner and place the present application in condition for allowance. Reconsideration is respectfully requested.

35 U.S.C. § 112

Claim 6 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Specifically, the Examiner asserted that the scope and meaning of the term "non-functional" is indefinite as it fails to recite the "function." This rejection is traversed and reconsideration is respectfully requested.

Instant claim 6, which depends from claim 1, recites the film of claim 1 optionally containing a non-functional level of binder material. The phrase "functional level" with respect to binder material is used in the instant specification at page 33, line 21, to describe certain embodiments which comprise binder material, but in amounts which may be less than a functional level. Since "functional level" is not specifically defined in this context, its plain meaning may be inferred as the intended meaning. The function of a binder in the coating arts is to hold dry powders or aggregate together (see Hawley's Condensed Chemical Dictionary, Fourteenth Ed. 2001, p. 137, page copy included herein). Hence, a "functional level" of binder would be an amount that acts to bind (hold powders or aggregate together) the coating film ingredients. Such an amount should be readily and routinely ascertainable by a person of ordinary skill in the art. Clearly, a non-functional level of binder would be any amount less than this.

"The requirement that the claims 'particularly point[] out and distinctly claim[]' the invention is met when a person experienced in the field of the invention would understand the

scope of the subject matter that is patented when the claim is read in conjunction with the rest of the specification. 'If the claims when read in light of the specification reasonably apprise those skilled in the art of the scope of the invention, §112 demands no more.'" *Miles Laboratories, Inc. v. Shandon*, 997 F.2d 870, 875, 27 USPQ2d 1123, 1126 (Fed. Cir. 1993). Since a non-functional level of binder is readily ascertainable by a person of ordinary skill in the coating arts, then, in view of the instant specification, claim 6 must be considered definite because a person of ordinary skill in the art would be apprised of its scope. The rejection of claim 6 under 35 U.S.C. § 112, second paragraph is therefore overcome and reconsideration is respectfully requested.

35 U.S.C. § 102

Claims 1-7, 9-12, 24 and 25 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,989,696 to McCarthy et al. ("McCarthy"). Specifically, the Examiner asserts that Example 8 of the reference discloses a film comprising fluorohectorite on a polymeric substrate in "an amount of about 0.5 mcg/cm^2." The Examiner further asserts that the deposited film is dried and not disclosed as having a residual water content, and that the small amount of material per unit area would be expected to exhibit a film thickness less than 300 nm. Additionally, the Examiner contends that the minimal particle size of Laponite^{TM} products would cause formation of transparent coating, and that additional properties disclosed by the applicant for the invention of the instant claim would be expected to be exhibited by the product of the reference as similar materials are used to form the films of each. This rejection is traversed and reconsideration is respectfully requested.

Present independent claim 1 is directed to a surface coating film for at least partially covering a surface. The coating film comprises a plurality of nonphotoactive nanoparticles which are present in an amount less than 3 $\mu g/cm^2$ of the area of the surface. Instant independent claim 24 is directed to a surface coating film for at least partially covering a

surface. The coating film comprises a plurality of nonphotoactive nanoparticles and water, with the film having a water content of less than or equal to about 4%.

McCarthy, on the other hand, discloses laminates comprising sandwiched, non-surface hectorite coatings (column 8, lines 42-43) which comprise nanoparticles present in amounts defined by coating weight units of pounds per square foot. Example 8, cited by the Examiner as disclosing a coating weight of "about 0.5 mcg/cm^2," in fact, does no such thing. The actual coating weight cited by McCarthy is 0.3 to 0.6 **lbs. /13,000 sq.ft.** Using the following conversion equation: (0.6 lb/13,000 sq.ft.)(454 g/lb)(10^6 μg/g)(1 sq.ft./929 sq.cm), 0.6lb/13,000sq.ft is equivalent to 22.5 μg/cm^2. Similarly, 0.3 lbs/13,000sq.ft. = 11.25 μg/cm^2. Thus, the coating weight disclosed by McCarthy in Example 8 is much larger than the "less than 3 μg/cm^2" recited presently in instant claim 1. In fact, McCarthy teaches higher coating weights in other reference examples, even stating in Example 3 that "coating weights above 0.7 lbs/sq.ft. ream perform well in electrographic printing" (column 16, lines 25-26). In the coating arts, 1 ream = 3,000 sq.ft., see IML Industry Standards, enclosed herein. Thus, 0.7/sq.ft. ream is equivalent to 114 μg/cm^2, and far greater than the upper limit of claim 1. McCarthy fails to teach, disclose or suggest any values for coating weight within or close to the instantly recited coating weight range. Moreover, the present inventive specification teaches the inventive significance of this range, stating that "coat weights of less than 3 μg/cm^2 have been found to produce residue-free coatings on high gloss surfaces, such as painted vehicle surfaces" (see page 15, lines 15-17).

Further, with regard to instant independent claim 24, the Examiner's assertions that the reference teaches a drying step and does not disclose the existence of residual water upon completion of the drying is highly imprecise. McCarthy does not teach what level of dryness must be obtained before a particular coating is considered "dry." In addition, the term "dry" is often used in the coating arts to be similar to the term "cure," and does not necessarily refer

to a state of dehydration. In fact, as an example of the imprecision of the meaning of the word "dry" or the state of "being dry" typical in the coating arts, the industry standard for "dry" when referring to a substrate means only that the substrate contains less than 15% moisture (see "A Glossary of Paint Terms, published electronically by U.S. Carboline, copy of page 4 enclosed herein). Applicants submit that it is not a typical or ordinary understanding in the coating arts that when something is subjected to a drying step, it will be completely dehydrated unless otherwise specified. Clays, and hectorite clays such as those included as ingredients in both McCarthy and the present inventive coatings are hydrophilic. Indeed, the hectorite coatings of McCarthy are applied as aqueous dispersions or mixtures (see, e.g. column 6, line 67), and are admixed with a 20% aqueous solution of starch prior to application (see, e.g., Example 1 in column 10). The only disclosure in McCarthy of anything which could be construed as indicating a post "drying" coating composition aqueous percentage is in Table 7A at column 17. Coatings are reported as percent solids, none of which correspond to a water content of less than 4%. Applicants find no disclosure in McCarthy of coatings having a water content of less than or equal to about 4% and, as demonstrated above, this limitation is not inherent in the "drying" teachings of McCarthy.

Anticipation under 35 U.S.C. § 102(b) requires the disclosure in a single prior art reference of each element of the claims under consideration, *Alco Standard Corp. v. TVA*, 1 U.S.P.Q.2d 1337, 1341 (Fed. Cir. 1986). McCarthy fails to teach surface coating films comprising nonphotactive nanoparticles present in an amount less than 3 $\mu g/cm^2$ of the area of the surface. Moreover, McCarthy fails to teach surface coatings for at least partially covering a surface comprising a plurality of nanoparticles and water, with the film having a water content less than 4%. Hence, independent claim 1, and claims 2-12 dependent therefrom, and independent claim 24, and claim 25 dependent therefrom, are not anticipated by McCarthy

and the rejection under 35 U.S.C. § 102(b) is overcome. Reconsideration is respectfully requested.

35 U.S.C. § 103

Claim 8 was rejected under 35 U.S.C. § 103(a) as being obvious and unpatentable over McCarthy, as applied in the prior rejection, in view of the American Heritage Dictionary entry for "wetting agent." Specifically, the Examiner asserts that the addition of a wetting agent to a film forming composition like that of the prior art would have been obvious to one of ordinary skill in the art because the definition of "wetting agent" teaches that it will cause a liquid to spread across and penetrate a surface more easily. This rejection is traversed and reconsideration is respectfully requested.

Claim 8 recites the film of claim 1 consisting essentially of nanoparticles, a wetting agent, and water. Since claim 8 depends from claim 1, the film of claim 8 comprises the limitations recited in claim 1 as well as the additional limitations recited in claim 8. McCarthy does not disclose, teach or suggest the surface coating film of claim 1. There is no disclosure, either in text or via example, of film coatings having coating weights in the instantly recited range. Moreover, the McCarthy nanoparticle coatings are never located at the surface of the substrate, rather, McCarthy teaches that it is "advantageous to minimize the exposure of the hectorite coating," and that the hectorite coating is always "buried" (column 8, lines 35-44). Hence, there is not only no teaching or suggestion in McCarthy of the instantly recited coating weight ranges, there is no motivation relevant to the laminate utility taught by McCarthy to provide coating weights within that range - presently taught as superior for high-gloss surfaces. The secondary reference, the American Heritage Dictionary, fails to address or overcome the deficiencies of the primary reference, McCarthy.

To establish prima facie obviousness of the claimed invention, all the claim limitations must be taught or suggested by the prior art, *In re Royka*, 490 F.2d 981, 180

U.S.P.Q. 580 (CCPA 1974). Since the combination of McCarthy and the American Heritage Dictionary fails to disclose, teach or suggest all the limitations of instant independent claim 1, and the requisite motivation to modify the teachings of McCarthy to result in the claimed invention is missing, is not independent claim 1, is nonobvious in view of McCarthy and the American Heritage Dictionary. Dependent claims are nonobvious under §103 if the independent claims from which they depend are nonobvious. *In re Fine,* 837 F.2d 1071, 5 USPQ 2d 1596 (Fed. Cir. 1988). Hence, dependent claim 8 is nonobvious over the combination of McCarthy in view of the American Heritage Dictionary, and the rejection has been overcome. Reconsideration is respectfully requested.

It is believed that the above represents a complete response to the Office Action dated December 1, 2003, and to the rejections of claims 1-12, 24 and 25 under 35 U.S.C. §§ 112, second paragraph, 102(b) and 103(a). Reconsideration and an early allowance are respectfully requested.

Respectfully submitted,

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TEST PROCEDURE GUIDELINES

TEST METHODS: **APPLIED ADHESIVE COATING WEIGHT**

PURPOSE OF PROCEDURE:

To determine the amount of adhesive coating applied to substrate.

DEFINITION OF TERMS:

Adhesive Coating Weight: This term refers to the amount of adhesive that has been applied to the substrate. Results are stated in pounds per ream or grams per square meter, with a ream being 3000 square feet or 278.7 square meters.

EQUIPMENT/MATERIALS NEEDED:

1. Analytical balance
2. Metal Template 4 in. x 4 in (10.2 cm x 10.2 cm).
3. Cutting tool (razor blade)
4. Heptane (other suitable solvents such as toluene or MEK may be acceptable or preferred.)
5. Tissue
6. Hot air blower (optional)

TEST PROCEDURE:

1. Cut sample using template
2. Weigh sample and record weight
3. With adhesive coating side up, remove coating using tissue and Heptane
4. Air dry for five minutes, or dry with hot air blower
5. Reweigh sample
6. Subtract second weight from first weight to obtain adhesive coating weight in grams.
7. Multiply by 59.4714 to obtain weight in lbs. per ream. (Ream = 3000 sq. feet) or multiply weight in grams by 97 to obtain weight in grams/square meter.

DOCUMENTATION:

The allowable tolerance that is agreed upon by the customer should be in written specifications

provided by the customer.

APPLIED ADHESIVE COATING WEIGHT (cont'd)

The frequency of the test to be performed must also be agreed upon by the customer. That is to say that the customer should provide in his specification how often the test is to be done and by what form of sampling method, random or non-random. These will be used to record results.

Many customers will require representative samples to be kept in inventory to reference in the event that the customer finds a defect in the provided order. This frequency of these retains should also be specified to ensure compliance.

REFERENCES:

TERM	DEFINITION
Catalyst	An accelerator, activator or curing agent which chemically increases the rate of reaction in a coating.
Cathode	The negative terminal of an electrolytic cell which, in the corrosion process, is protected and not attacked.
Cathodic Protection	The reduction or prevention of corrosion of a metal surface caused by making it cathodic. This is accomplished by using a sacrificial anode (such as in zinc rich coatings or galvanizing) or by using impressed current.
Caustic	A strong base or alkaline material.
Caustic Soda	A common name for sodium hydroxide, a strong base or alkali.
Cellosolve	Proprietary name for ethylene glycol monoethyl ether. A slow evaporating, water miscible, relatively strong solvent often used in epoxy coatings.
Cementitious Coatings	A coating containing Portland cement as one of its components held on the surface by a binder.
Centipoise	One hundredth of a poise which is a unit of measurement for viscosity. Water at room temperature has a viscosity of 1.0 Centipoise.
Chalking	The formation of a friable powdery coating on the surface of a paint film, generally caused by exposure to ultraviolet radiation resulting in a loss of gloss.
Checking	Cracks in the surface of a paint film.
Chipping	Small pieces of paint removed from the surface, typically a sign of physical damage incurred in shipping or handling. Use of a surface tolerant primer for touch up followed by the same finish coat generally solves the problem.
Chlorinated Hydrocarbon	A class of strong, fast evaporating, nonflammable solvents such as carbon tetrachloride, methylene chloride or trichloroethylene.
Chlorinated Rubber	A coating resin formed by the reaction of rubber with chlorine gas. Often used for chemical or water resistant properties.
Clean and Dry	Rather than a method, the requirement for Clean and Dry describes the condition of the surface prior to painting. The surface shall be clean, dry, and free of oil, grease, wax, form oils, and any other contaminant that may affect the adhesion of the coating. For best results and high performance requirements remove laitance and contaminants from precast and cast-in-place concrete by abrasive blasting or high pressure water blasting. Dry means that the substrate contains less than 15% moisture. Concrete should be cured at least 28 days and mortar joints at least 15 days @ 75F and 50% RH. See also: ASTM D 4263 - 83 ; ASTM D 4258 - 83 ; ASTM D 4259 - 83 ; ASTM D 4260 - 83 ; ASTM D 4261 - 83 ; ASTM D 4662 - 83 .

Hawley's

Condensed Chemical Dictionary

Fourteenth Edition

Revised by

Richard J. Lewis, Sr.

JOHN WILEY & SONS, INC.

"Bidrin" *[Shell].* (TM for dimethyl phosphate of 3-hydroxy-*N*,*N*-dimethyl-*cis*-crotnamide; dicrotophos).
CAS: 141-66-2.
$(CH_3O)_2P(O)OC(CH_3):CHC(O)N(CH_3)_2$.
Properties: Brown liquid with a mild ester odor. Bp 400C. Miscible with water and xylene; slightly soluble in kerosene and diesel fuel. Commercially available water-miscible solution.
Hazard: Cholinesterase inhibitor. TLV: 0.25 mg/m³. Toxic by skin absorption.
Use: Insecticide.

biformin. $C_6H_6O_2$. An antibiotic produced by the fungus *Polyporus biformis*, reported to be active against various bacteria and fungi.

Biginelli reaction. Synthesis of tetrahydropyrimidinones by the acid-catalyzed condensation of an aldehyde, a β-keto ester, and urea.

"B-I-K" *[Uniroyal].* TM for a surface-coated urea.
Properties: White powder. D 1.32, melting range 129–134C. Soluble in water. Surface coating not soluble in water but soluble in rubber. Slightly soluble in acetone; insoluble in benzene, gasoline, and ethylene dichloride.
Use: Promoter for azodicarbonamide, a nitrogen blowing agent; activator for thiazoles, sulfenamides, and thiurams; odor reducer when used with nitrosoamine-type blowing agents.

bile acid. An acid found in bile (secretion of the liver). Bile acids are steroids having a hydroxyl group and a five-carbon-atom side chain terminating in a carboxyl group. Cholic acid is the most abundant bile acid in human bile. Others are deoxycholic and lithocholic acids. The bile acids do not occur free in bile but are linked to the amino acids glycine and taurine. These conjugated acids are water soluble. Their salts are powerful detergents and as such aid in the absorption of fats from the intestine.

bile salts. Sodium salts of glycocholic and taurocholic acids important for physiological fat absorption.

bilirubin. (bilifulvin). $C_{33}H_{36}O_6N_4$. Red coloring matter of bile. Also occurs in blood serum as decomposition product of hemoglobin.
Properties: Orange-red powder. Mp 192C. Soluble in acids, alkalies, chloroform, and benzene; insoluble in water; very slightly soluble in alcohol and ether.
Derivation: From bile pigment.
Use: Analytical chemistry, biochemical research.

bimetal. A type of thermometer in which the sensing element consists of two thin strips of metals having different expansion coefficients bonded together in a helical or spiral structure. The extent of deflection or bending induced by temperature change is indicated by a pointer on a dial. Reasonably accurate readings are obtained in this way, the range being from −185 to 425C. Bimetals are used in both laboratory and industry.
See thermometer.

binapacryl. Generic name for 2-*sec*-butyl-4,6-dinitrophenyl-3-methyl-2-butenoate. $C_{15}H_8O_6N_2$.
Hazard: Toxic by ingestion and inhalation.
Use: Acaricide and fungicide.

binary. Descriptive of a system containing two and only two components. Such a system may be a chemical compound composed of two elements, an element and a group (hydroxyl, methyl, etc.), or two groups, (e.g., oxalic acid). It may also be a two-component solution or alloy.

binary acid. An acid containing no oxygen, e.g., hydrofluoric acid.

binary alloy. Alloy containing two major elements, exclusive of impurities.

binary diagram. Constitution diagram for a binary metal alloy system.

bind. To exert a strong physiochemical attraction, as often occurs between various proteins and water in hydrophilic gels, between organic dyes and fabrics, or between acids or bases and various chemical complexes.

binder. (1) The film-forming ingredient in paint, usually either a drying oil or a polymeric substance. (2) In the food industry, a material used in sausage manufacture that absorbs moisture at high temperatures, e.g., various flours, dried milk, and soy protein. (3) Any cementitious material that is soft at high temperatures and hard at room temperature, used to hold dry powders or aggregate together, e.g., asphalt and sulfur in paving compositions, and resins used in sand casting.
See paint.

binding energy. The energy that holds the protons together in an atomic nucleus. Since protons are positively charged, they exert strong mutually repulsive forces and tremendous energy is required to keep them from flying apart. This energy is so great that it results in a slightly lower value for the mass of a nucleus taken as a whole than for the sum of its constituents taken individually. This phenomenon is of vast significance, for it means that a small fraction of mass has been converted into energy within the nucleus, as shown by Einstein's equivalence equation $E = mc^2$. Thus, when a ^{235}U nucleus (92 protons) is split, as in the fission process, a portion of its binding energy (equivalent to the mass difference) is released. It amounts to approximately 200 million